CLAIMS

1. A radiator for a vehicle, comprising:

an inlet header;

an outlet header;

a soldered core with a core length "h" and a core depth "t", said core having

a plurality of coolant flat tubes joining said inlet header and said outlet header, and

cooling fins on opposite sides of said coolant flat tubes; and

a multifunction flat tube on one side of said core and having a greater section modulus (Wx, Wy) than said coolant flat tubes, said multifunction flat tube being soldered to adjacent cooling fins and said inlet and outlet headers whereby said multifunction flat tube carries coolant from said inlet header to said outlet header.

2. The radiator of claim 1, further comprising a second multifunction flat tube on the opposite side of said core and soldered to adjacent cooling fins and said inlet and outlet headers whereby said second multifunction flat tube carries coolant from said inlet header to said outlet header, said second multifunction flat tube having a greater section modulus (Wx, Wy) than said coolant flat tubes.

3. The radiator of claim 1, wherein said radiator is a downdraft radiator with said inlet header on top and said outlet header on the bottom, and said inlet and outlet headers include

a plurality of openings each of which receives an end of one of said coolant flat tubes, and

an end opening receiving an end of said multifunction flat tube, said end opening being larger than each of said plurality of openings.

4. The radiator of claim 1, wherein said multifunction flat tube has substantially the same length "h" and depth "t" as said core.

5. The radiator of claim 1, wherein said multifunction flat tube is formed by one of soldering and welding.

6. The radiator of claim 1, wherein said multifunction flat tube includes walls extending the depth of said core, said tube walls being deformed along their length between said inlet and outlet headers to define separate coolant passages.

7. The radiator of claim 1, wherein said multifunction flat tube includes flat walls extending the depth of said core, and further comprising an insert between said flat walls of said multifunction flat tube, said insert defining coolant passages through said multifunction flat tube between said inlet and outlet headers.

8. The radiator of claim 1, wherein said multifunction flat tube includes flat walls extending the depth of said core with inward directed protrusions, said protrusions being connected to each other.

9. The radiator of claim 1, wherein the inner flow resistance of the multifunction flat tube is substantially smaller than the inner flow resistance of said coolant flat tubes.

10. The radiator of claim 1, wherein said multifunction flat tube has a wall thickness substantially greater than the wall thickness of said coolant flat tubes and a tube height substantially greater than the height of said coolant flat tubes.

11. The radiator of claim 10, wherein said multifunction flat tube wall thickness is at least two times the wall thickness of said coolant flat tubes.

12. The radiator of claim 11, wherein said multifunction flat tube wall thickness is at least about 1.0 mm.

13. The radiator of claim 10, wherein the height of said multifunction flat tube is at least two times the height of said coolant flat tubes.

14. The radiator of claim 13, wherein the height of said multifunction flat tube is at least about 10 mm.

15. The radiator of claim 1, wherein said flat tubes extend generally vertically with said inlet header soldered to the upper ends of said flat tubes, and further comprising:

a partition in said inlet header defining first and second chambers, said first chamber being above said multifunction flat tube and said second chamber being above said coolant flat tubes; and

a filling line between a coolant fill supply and said first chamber for adding coolant to said radiator.

16. The radiator of claim 15, wherein said filling line slopes down from the coolant fill supply to the first chamber.

17. A radiator for a vehicle, comprising:

an inlet header;

an outlet header;

a soldered core having a plurality of coolant flat tubes joining said inlet header and said outlet header, and cooling fins on opposite sides of said coolant flat tubes; and

a multifunction flat tube

which is soldered to adjacent cooling fins on one side of said core and to said inlet and outlet headers whereby said multifunction flat tube carries coolant from said inlet header to said outlet header, and

having an inner flow resistance which is substantially smaller than the inner flow resistance of said coolant flat tubes whereby more coolant flows through said multifunction flat

tube than flows through an individual coolant flat tube per unit time to influence temperature distribution over the entire radiator.

18. The radiator of claim 17, further comprising a second multifunction flat tube on the opposite side of said core and soldered to adjacent cooling fins and said inlet and outlet headers whereby said second multifunction flat tube carries coolant from said inlet header to said outlet header, said second multifunction flat tube having an inner flow resistance which is substantially smaller than the inner flow resistance of said coolant flat tubes whereby more coolant flows through said second multifunction flat tube than flows through an individual coolant flat tube per unit time to influence temperature distribution over the entire radiator.

19. The radiator of claim 17, wherein said radiator is a downdraft radiator with said inlet header on top and said outlet header on the bottom, and said inlet and outlet headers include

a plurality of openings each of which receives an end of one of said coolant flat tubes, and

an end opening receiving an end of said multifunction flat tube, said end opening being larger than each of said plurality of openings.